CONCEPTUAL DESIGN OF TRANSFER STATION/MATERIALS & ENERGY RECOVERY FACILITY CITY OF BERKELEY -- SOLID WASTE MANAGEMENT CENTER

FINAL REPORT
NOVEMBER 1980
EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

STATEMENT OF PROBLEM

The Berkeley Landfill will be reaching its projected capacity within the next four to six years and an alternative disposal method must be found and implemented prior to closure.

PROJECT EVOLUTION

The City of Berkeley's proposed Solid Waste Management Center (SWMC) is the newest step in a well-balanced and diligently developed solid waste management system.

The system itself already embraces the fundamental steps necessary for optimal operation of the SWMC: source separation, recycling centers and a bottle ordinance passed but currently under litigation.

It is envisioned that the SWMC would provide space for a recycling center with storage capabilities for curbside collection of source-grouped materials. Source separation through curbside collection in conjunction with materials brought to the facility by the general public would, it is anticipated, recover some 15% or more of the total Berkeley waste stream.

The remaining waste requiring disposal would be handled at the proposed transfer station/materials and energy recovery facility, which would have two main functions: to receive, process and recover (secondary materials) and convert (to energy) generated wastes; and to transfer the wastes to a distant landfill in the event of extended downtime of the process, material recovery and/or energy conversion equipment.

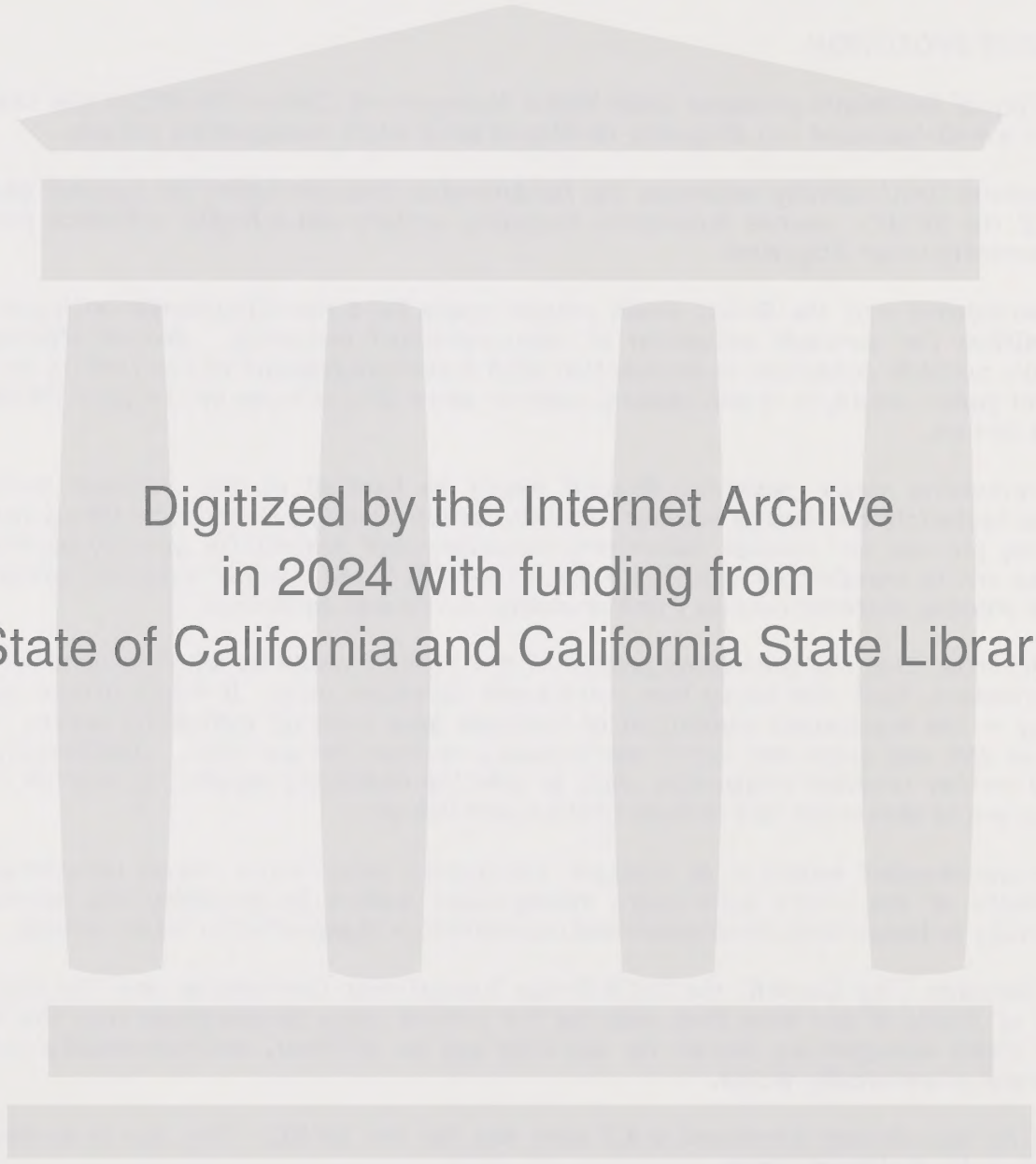
It is intended that the processing portion of the facility would incorporate hand-sorting of cardboard, light and heavy iron metals and aluminum cans. It would utilize trommeling — the mechanical separation of material by a rotating cylindrical screen — to remove dirt and glass and would mechanically recover ferrous cans. Additionally, it would employ modular combustion units to burn the remaining organics to provide electricity and/or steam for sale to local utilities and industry.

The recommended selection of modular combustion units would ensure uninterrupted continuity of the City's solid waste management system by providing the necessary flexibility to handle both predictable and unpredictable changes in the waste stream.

The Berkeley City Council, the Solid Waste Management Commission and the Department of Public Works have been working for several years to guarantee that the total Solid Waste Management System for the City will be efficient, environmentally acceptable and economically viable.

The City has already purchased a 6.3 acre site for the SWMC. The site is on Second Street north of Gilman Street.

A number of previous studies have been conducted by the San Francisco firm of Garretson · Elmendorf · Zinov (G·E·Z), Architects and Engineers, and its subsidiary Brown, Vence and Associates (BVA), Energy and Environmental Engineers to conceptualize the SWMC and to investigate the most appropriate energy recovery technology



for the City. Modular combustion has been recommended. An environmental impact report has been prepared by Spectrum Northwest, Social and Environmental Planning Consultants, also of San Francisco.

SCOPE OF WORK

The present scope of work was to develop a conceptual design for the Berkeley SWMC incorporating modular combustion units. This included the following tasks:

- *Confirmation of markets for recovered materials and energy.*
- *Analysis of waste stream.*
- *Assessment of front-end processing technology.*
- *Identification of regulatory agency requirements and environmental constraints.*
- *Preparation of preliminary design and budget cost estimates for the transfer station/modular combustion plant.*
- *Development of financing and procurement arrangements.*
- *Identification of project risks.*
- *Establishment of an Implementation Masterplan.*

FINDINGS

Confirmation of Markets for Recovered Materials and Energy

- *Markets have been investigated for the purchase of the following recovered energy and materials:*
    - *Electricity - PG&E has agreed to purchase the electricity in a negotiable Power Sales Agreement (PSA).*
    - *Steam - Cal-Ink is a possible steam market. It has hired a consultant to investigate its future steam needs and if SWMC steam use is determined feasible, Cal-Ink will direct a Letter of Interest to the City in late 1980.*
    - *Secondary Materials - A number of previously-contacted firms are willing to bid for the ferrous and aluminum metals and cardboard on a five-year contract with established floor prices or prices pegged to an industrial index.*

Analysis of Waste Stream

- *Refuse sampling studies confirm earlier composition estimates of newsprint, cardboard, aluminum and glass, with slightly less ferrous metals than expected.*

- *It was found that enough solid waste remains after source separation and recycling to necessitate five 50 TPD modular combustion/boiler units for on-site conversion into a salable energy product.*

Assessment of Front-End Process Technology

- *Three appropriate front-end processing technologies were considered worthy of investigation in an attempt to improve refuse combustion, reduce ash production and recover secondary materials. They are:*

  - *Size reduction.*

  - *Size reduction followed by air classification.*

  - *Trommeling.*

Identification of Regulatory Agency Requirements and Environmental Constraints

- *The project will require air emission controls.*

- *Three potential particulate control technologies capable of meeting the Bay Area Air Quality Management District's (BAAQMD) regulatory limits are:*

  - *Electrostatic Precipitators.*

  - *Baghouses.*

  - *Dry Scrubbers.*

- *Best Available Control Technology (BACT) for nitrogen oxides (NO_x) and sulfur dioxide (SO_2) is undefined and, therefore, must be determined by the BAAQMD as soon as possible after selection of a specific modular combustion unit.*

- *Water - No water quality impacts are envisioned other than water to be used for general facility requirements and discharged into the East Bay Municipal Utility District (EBMUD) sanitary sewer system.*

- *Residues - Process residues will require landfilling. Ash may require landfilling in a Class I hazardous waste site; however, there is a possibility that disposal in a Class II-1 or limited-hazardous waste site will be approved, which may significantly reduce overall project costs.*

- *Noise - Compliance with all local, state and federal regulations can be achieved.*

- *Permitting time frames have been estimated:*

  - *Preapplication negotiations and review period - 1 month. (Preapplication negotiations with the BAAQMD will take much longer.)*

  - *Preconstruction permitting process - **9 to 33** months depending on permit requirements and speed of regulatory agency review.*

- *Remaining permitting period during final construction and initial project startup - **2 to 3** months.*

Preliminary Design and Budget Cost Estimates for the Transfer Station/Materials and Energy Recovery Facility

- *Owning and operating costs for materials and energy recovery over a 20-year period are estimated to be about half those for the transfer and haul alternatives, assuming Class II-1 disposal of ash.*

- *If Class I disposal of ash is required and utilized, then the estimated saving between materials and energy recovery alternatives and transfer and haul alternatives is reduced.*

- *At Class I disposal costs, other alternatives for ash disposal become attractive. One alternative which was investigated was to convert the ash into concrete-like slurry, from which a multitude of useful products could be formed. Though this process has been demonstrated on a laboratory scale only, cost appears to be about 60% of the transfer, haul and disposal costs at a Class I landfill.*

- *The 1984 capital costs for the transfer station are estimated in the $5-$6 million range.*

- *The 1984 capital costs for the materials and energy recovery facility are estimated in the $28-$30 million range.*

Development of Financing and Procurement Arrangements

- *A variety of financing and procurement arrangements exist consisting of any combination of public/private involvement. Monies are available in the City's Refuse Disposal Development Fund for funding portions of the proposed facilities. Federal funds also exist for construction purposes.*

Identification of Project Risks

- *Risks of Doing Nothing -*

  - *If the City elects not to implement a transfer or materials and energy recovery system, City collection vehicles will be required to travel greater distances for refuse disposal after the City landfill closes. Because the City's collection fleet is old and not designed for this type of operation, excessive equipment maintenance, costs and downtime can be anticipated.*

- *Materials and Energy Recovery Risks -*

  - *Waste Stream Supply: The City controls through its municipal collection service only 30% of the refuse currently disposed at the Berkeley Landfill. Should the City implement a materials and energy recovery project designed on the full landfill tonnage, the City runs the risks of opening the doors to the facility and finding the only waste delivered is the City-collected refuse.*

- *Energy Markets: The commitment of Cal-Ink to purchase steam from the project is still questionable. Should Cal-Ink wish to participate, their financial stability and future plans represent another risk.*

- *Disposal Facilities: Of the risks that will impact the costs of the proposed project, one of the greatest is associated with the disposal of ash. Dependency upon outside-county landfills runs the risk of importation bans and excessive disposal fees.*

- *Facility Construction: Delays can result in greatly increased construction costs. Various risks are associated with project financing such as fluctuating interest rates or simply the difficulty in meeting financing requirements. Changes in laws and regulations could also occur that could increase costs and delay the project. Once the facility is fully constructed, it may be unable to meet performance specifications. Should private industry be asked to construct and/or operate the proposed facility, the City could lose access to the transfer station portion of the facility, thereby requiring City collection vehicles to long-haul refuse to the nearest landfill if for any reason the contractor should default.*

- *Facility Operation and Management: O&M costs could be higher than projected. Quality and quantity of products could be different than expected.*

- *Technical Risks: Key among these is the generation of electricity via superheated steam. Emission control also raises some risk consideration. The dry scrubber which is being proposed for particulate control has yet to be tested on emissions from a solid waste facility. Trommeling as a front-end process is also being proposed. While trommeling has been demonstrated, the trommel as conceptualized is required to make a three-way separation of the refuse. Only a two-way separation has been demonstrated.*

RECOMMENDATIONS

- *The City should proceed with a three-phased construction schedule for the SWMC beginning with the implementation of the recycling center, first; the transfer station, second; and the materials and energy recovery facility, third.*

- *The recommended transfer station utilizes a receiving floor where refuse is deposited and from which long-haul transfer-trailer rigs haul wastes to the closest available landfill.*

- *The materials and energy recovery facility recommended incorporates modular combustion units capable of producing a high temperature and pressure steam for sale to local industry and/or efficient electrical production for use by City operations or sale to PG&E. Trommeling should precede modular combustion in an effort to improve combustion, reduce ash production and recover secondary materials. To control emissions from the combustion units, a dry scrubber is recommended.*

- *The City should proceed with the building of the transfer station by hiring an architectural/engineering consultant and bidding out the construction, materials and equipment.*

- *Recommended financing of the transfer station portion is via the use of monies in the City's Refuse Disposal Development Fund.*

- *The City should simultaneously initiate the building of the resource recovery system by pursuing the following schedule:*

    - *Selection of a qualified Consultant Team to assist the City in all remaining aspects of project development.*

    - *Prequalification of prospective private-industry proposers providing facility financing, construction and operation (full service).*

    - *Selection of a full-service contractor.*

    - *Negotiation of contracts between the City and selected full service contractor and between the City and other local resource recovery projects.*

    - *Negotiation and finalization of all required residual disposal and market contracts by the City.*

    - *Securement of all required permits by the City.*

    - *Construction.*

    - *Shakedown.*

    - *Startup.*

- *If implementation goes according to schedule, startup should occur in 1985. To minimize risks discussed previously, the City should:*

    - *Own the transfer station portion of the facility to reduce the risk of contractor default.*

    - *Select a full-service contractor with responsibilities for financing, construction and operation of the materials and energy recovery portion of the SWMC, including meeting all terms and conditions of contracts. The City may be required to minimize private industry's risks by such methods as guaranteeing a set revenue for the operation of the facility by the private operator.*

    - *Sign a contract with the full-service contractor to guarantee a minimum amount of income from tipping fees.*

    - *Continue to develop a relationship with Cal-Ink and PG&E and participate in negotiations between the selected contractor and the markets.*

- *Begin discussions with landfill operators to establish preliminary terms and conditions for residue and ash disposal and participate in long-term negotiations.*

- *Aggressively pursue regulatory agency permission of Class II-1 disposal.*

- *Further development of the SWMC should include the following steps:*

  - *Continuation of present management activities as needed.*

  - *Continuation of the public participation program conducted during the present phase.*

  - *Continuation of the monitoring of waste quantities and compositions.*

  - *Securement of ash disposal agreements from regulatory agencies and site operators to allow ash disposal in a Class II-1 site.*

  - *Performance of periodic design and construction reviews to ensure satisfaction of all City requirements.*